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TECHNOLOGY EDUCATION TEACHER PERCEPTIONS ABOUT LEARNING ACTIVITY MODULE FOR TECHNOLOGY EDUCATION.

By

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A Research Paper

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ABSTRACT

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Technology Education Teacher Perceptions about Learning Activity Modules for Technology Education.

(Title)

Technology Education	Dr. Kenneth Welty	August/2000	55
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(Name of Style Manual Used in this Study)

Technology education is changing with new technologies springing up everyday. With these new technologies emerging teachers are faced with the challenges of teaching new concepts and skills. Schools must be prepared to meet the requirements of teaching new technologies. One popular way of meeting this challenge is to utilize modular units of instruction.

Many factors need to be considered before modular learning should be integrated into the technology classroom. Where will the financing for a new modular technology lab come from? What level of educational value do these programs have before they are purchased. The purpose of this study was to determine the perceptions that novice technology education teachers have about learning activity module for technology education. More specifically, it sought to determine the features and characteristics that novice technology education teachers perceive as having educational value. This study was the first step in establishing criteria for the evaluation of learning activity modules

The data was gathered with a survey featuring items that were constructed around the features and characteristics that should exist in any quality learning activity. The survey asked the teachers if these features and characteristics should also be present in a learning activity module. The findings and conclusions of this study suggested a quality learning activity module should show both men and women, people of different ethnic backgrounds and different age groups engaged together in technological activities. Furthermore, they should utilize clear directions, simple activities, and rich visuals to present the content. Other important featured include:

- Maintaining continuity from the objectives through the learning activity and to the test items.
- Helping students connect the content to be learned with patterns of knowledge, everyday life, past experiences, existing knowledge, and academic expectations.
- Including opportunities for students to practice what they have learned. Providing students feedback.
- Requiring students to reflect on how their new knowledge can be used in everyday life and the world of work.

The results of this survey indicated that teachers should carefully review all features and characteristics of the learning activity module, when selecting modules for implementation into a technology education program. Special emphasis should be placed on intellectual continuity between the objectives, learning activities, and assessment items. Furthermore, the module should follow at least a simple model of instruction that includes an overview of the content, a definition of objectives, a clear presentation of the

key concepts and skills, multiple opportunities for students to apply and practice their concepts and skills, and lastly, assessment tools that measure student learning.

When selecting a learning activity module, a teacher should have criteria for evaluating the educational value of the instruction. The conclusions of this study can be used to develop the criteria needed to evaluate learning activity modules for technology education curriculum.

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CHAPTER 1

INTRODUTION

Background of Problem

Technology education is changing with new technologies springing up everyday. At the speed of light people are communicating over fiber optic lines. Messages are being sent through the air with wireless communication. Manufacturing is becoming more efficient and reducing the costs of products. Houses are being built stronger with trusses using less wood. Vehicles can survive crashes better, get better miles per gallon, and handle the bumps and curves of the road better. Computers are getting faster processing speeds and are becoming easier to use. Information on almost any topic can be viewed from a computer that is hooked up to the web. These are examples of technologies that are being improved upon daily.

With these new technologies emerging teachers are faced with challenges of teaching. Communication, manufacturing, construction, transportation, electronics and computer technologies are ever-growing areas that need to be taught in technology education. Schools must be prepared to meet the requirements of teaching new technologies, and one way is by introducing modular learning.

Modular learning is a new approach to the delivery of technology education. These modules are self-paced learning activities that are being installed in schools across the nation to teach the ever growing and changing forms of technology. The modular learning approach is one method of teaching technology education.

With all new forms of technology there becomes a question of how teachers will teach the associated concepts. Modules are becoming a more popular delivery method for teaching technology. Modular classrooms are quickly replacing the traditional industrial arts classrooms.

Many factors need to be considered before modular learning should be integrated into the technology classroom. Where will the financing for a new modular technology lab come from? Modules have a very large price tag attached to them. Most modules require computers and equipment needed for modular learning. For a class of 30, with two students working at each station, the price would range from $80,000.00 to $250,000.00 for modules and furniture. (Mulford 1995). The costs of these labs are extremely high per student for those that will be served by modules.

In addition to worrying about financial funding, schools must also worry about the educational value of the programs they are purchasing. Vendors are the companies who supply schools with the learning modules. Vendors' primary goal is to make profits, not to educate students. (Daugherty & Foster, 1996). Vendors also have control over what is included, and more importantly what is excluded. However Gloeckner says that "Actually, many of the modular labs have been developed by former teachers, so they are already factoring in their image of what constitutes a worthwhile educational experience "(p.31). Teacher-developed modular programs would hopefully increase the educational value of the modules. The presumption is that teacher-developed modules would have all of the necessary principles of a learning activity that would make this module better than modules

that were not teacher-developed. This may or may not be an accurate presumption, but it makes the quality of the module to be perceived as better because itwas developed by a teacher.

Another consideration is determining an appropriate age to introduce modular learning. Should students be introduced to learning modules at the high school level? George E. Rogers a professor at University of Nebraska—Lincoln in his article, Technology Education Curricular Content: A trade and Industrial Education Perspective (1995), believes that high school should be the first place that students should be exposed to modular and technical learning. Rogers (1995) discusses the need for technology education to prepare students for advanced secondary vocational programs. Rogers further notes that "an articulation between the two programs is lacking"(p.32). Implementing modular learning will provide an introduction of modular learning styles of technology education in a pre-vocational setting.

All of these are factors contribute to why technology educators need a guideline for learning modules. They may need to be able to choose and evaluate modules before they have made a large investment into learning modules. Because of the lack of evaluation methods for modules, there is a need for a consumer-oriented evaluation of learning modules. This study will deal with the first step of establishing an evaluation of learning activity modules by determining what features and characteristics technology education teachers perceive as having educational value.

Statement of the Problem

Technology is changing rapidly with new technologies and improved technologies springing up daily. Technology educators are faced with the challenges of teaching these new technologies and their concepts. One method of teaching is by introducing modular learning. Modular Learning is a new approach to teaching technological concepts. Modules are currently being implemented into technology education programs.

Many factors need to be considered before modular learning should be implemented into the technology classroom.

- What features and characteristics do technology education teacher perceive as having educational value for a learning activity module.
- What criterion is used to determine the educational value of modular programs?
- How is this criteria used to evaluate and implement modular learning in a technology education program?
- Where will the financing for a new modular technology lab come from?

Purpose of this Study

The purpose of this study is to determine the perceptions that technology education teachers have about learning activity module for technology education as measured by a survey derived from the research.

Limitations of the Study

The limitation of this study was the survey was administered limited to novice teachers with little or no experience with learning activity modules.

Definition of Terms

Technology: "Technology is human innovation in action. It involves the generation of knowledge and process to develop systems that solve problems and extend human capabilities." (Technology for All Americans Project, 1996, p.16)

Technology Education: "Technology education is a school subject to develop technological literacy." (Technology for All Americans Project, 1996, p.6)

Technology Literacy: Technological literacy is the ability to use, manage, and understand technology. (Technology for All Americans Project, 1996, p.6)

Modular Learning: Is a new approach to technology education, One to two students work through a learning activity specially designed to teach one subject.

Modules: A module is the equipment and supplies needed for modular learning. It can be done with a computer or without a computer.

Provisional License: Temporary license that allows an uncertified teacher to teach and work towards certification of a 220 license.

220 License: A certified technology education teacher license that allows a teacher to teach technology education classes.

Vendors: The companies that design, build and sell modules.

CHAPTER 2

REVIEW OF LITERATURE

Modular Learning and A Changing Technology Education Class

The future of technology education is changing into a future filled with new technology and new challenges; schools must be prepared to meet the requirements. One way is to install modular learning. Modular Learning is a new approach to teaching technological concepts currently implemented into schools that will eventually replace the traditional industrial arts settings. Many factors need to be considered before implementing a modular approach to learning; teachers, students, and parents need to be ready to meet the requirements associated with the modular technology. Teachers must have the ability to teach the new modular curriculum, which may require additional teacher training. Module learning curriculum has become a debated area because schools are trying to determine its placement in accordance with other subjects in school curriculum. Parents and other taxpayers need to be aware of the costs involved in setting up modular learning facilities. These factors must be considered before schools can change from Industrial Arts/Technology Education classrooms to Technology Education/Modular Learning classrooms.

Modules are changing the Technology Education classrooms into modular technology labs. A definition of a module according to Stephen Petrina (1993):

> A module is a defined lab space where students spend a majority of their classroom time completing the instructional activities. This space is equipped with all the materials, tools and equipment that students may require to complete the learning activities. The student

> follows a set of self-directed instructions that introduce concepts, reinforces the concept, provides hands-on activity demonstrating the concept and allows for validation and evaluation by the instructor (p. 4).

According to the article, A (articulated k-12) Curriculum to Reflect Technology, 1998) "Every parent wants his and her child to reap the benefits of technology in education" (p.1). One question remains that has to deal with is the what, who, and how "technology" will be infused into the curriculum"

Financing Modular Learning

Financing the new installations of computers and equipment needed for modular learning is one of many questions that need to be addressed. Carolyn Mulford (1995) conducted a study of eighth graders at Nellie Coffman Middle School, the vendor Roland Johnson stated that modules and furniture for a class of 30, with two students working at each station, range from $80,000.00 to $250,000.00. The costs of these labs are extremely high, and contrary to common belief sometimes these new labs do not use computers. Mulford (1995) noted, "In the transportations section, students study the roles of radiant, chemical, mechanical, electrical, thermal, and nuclear energy. Equipment includes a wind tunnel, a weight set, a water basin, a videotape and two reference books. Not all modules require computers" (p.2).

Receiving funding and community support is a major factor in determining whether schools will be able to remodel their classrooms. Herschbach, D. (1992) suggested "that by the end of the decade the transformation from industrial arts to technology education will be complete. There is less certainty, however, that the public will understand what technology education entails"(p.4). Public perception

will be a major factor in receiving the funding needed for technology education. Parents and taxpayers need to understand the future in education begins with students becoming technically literate.

School districts may not have the resources to fund the cost of installing and implementing modular learning facilities. Some suggestions for cost reduction strategies from Dr. Kenneth Welty (1996) are having teachers making the furniture, schools purchasing discrete components, teachers developing their curricula, and selling off old equipment. Carolyn Mulford (1995) notes that many schools cut costs by developing some or all of their own modules, using existing computers and even building their own furniture. Stephen Petrina (1993) agrees funding will be a problem. Petrina states "in a finding of cost for the company Synergistic's MATE (Modular Approach To Technology Education) the cost ranging from $2,495.00 to $12,980.00, Heralihy's, another vendor, prices modular stations from $329.00 to $3,235.00 and other corporate MATEs within similar ranges"(p.4). The concern Petrina expresses is the cost to the taxpayers. Supplementing older computers and having schools build their own labs saves on the cost to the parents and taxpayers.

In addition to worrying about financial funding, schools must worry about the educational value of the programs they are purchasing. In the article, Educators Address Modular Instruction (Daugherty& Foster, 1996), Petrina asks the question of who is calling for the change in technology education using modular learning. Petrina, (Daugherty & Foster, 1996) states that the production of modules has largely been a commercial affair, but the adoption of modules has been an educational and political affair. Petrina further notes that a vendor's primary goal is

to make profits, not to educate students. In the interview by Daugherty and Foster, (1996), Gloeckner defended vendors for their efforts to produce modular learning systems. Gloeckner also stated, "Actually, many of the modular labs have been developed by former teachers, so they are already factoring in their image of what constitutes a worthwhile educational experience" (p.31). Buying teacher-developed modular programs would be the best method of selecting programs designed to teach students.

Changes in Curriculum

Carolyn Mulford (1995) notices that teaching in the industrial arts classes is changing; Mulford conducted a study of two schools using the modular systems. Mulford (1995) notes, "The two middle schools are part of a trend away from teaching specific, basic manual skills and toward introducing young people to a range of new career fields. Instead of building birdhouses, for example, students now are exploring career-linked technologies and becoming technologically literate. In doing so they are applying lessons from their academic classes and developing problem-solving skills" (p.1). The curriculum will also need to be changed to meet the needs of the modular learning system.

The curriculum in schools need to be developed to adapt to the changes taking place in technology classrooms. Richard A. Boser, James D. Palmer and Michael K. Daugherty (1998), in their article, Students' Attitudes Toward Technology in Selected Technology Education Programs, they agree "It is clearly difficult to measure a construct if it has no readily agreed upon boundaries. To resolve this problem, many technology education programs limit the scope of their

curriculum to industrial technology" (p.2.). Roger B. Hill, Robert C. Wicklein and Michael Daugherty (1996) note "some view technology as a part of science curriculum, while other think it is more closely allied with engineering. Some schools place technology as a component of vocational education; others believe that technology should be taught in an integrated manner with mathematics, science, social studies, and other subjects" (p.6). The question of where does the modular learning curriculum fall is not easily answered because of the nature of modular learning.

Modular learning is considered to be an academic area of questionable purposes. Roger B. Hill (1997) in the article, The Design of an Instrument to Assess Problem Solving Activities in Technology Education, is assessing the purpose of modular learning in the classroom in reference to a student's ability to develop skills in problem solving. Hill considers the issue in modular learning to be whether or not students are developing the ability to solve problems, to think analytically and apply technical knowledge to real work situations. Hill further notes "assessing a student's work provides a teacher with the knowledge to make changes for his education goals and change the modules to produce the desired learning outcome for the student" (p.2). The ability to assess the student's progress and adapt the program for the student's benefit is a wonderful advantage to meeting the highest level of education in the technology field for the student.

One of the greatest advantages of modular learning is that teachers can change the programs to better suit the needs of their students. In Carolyn Mulford's (1995) study of the two schools she found that Denise Mariger the teacher at Nellie

Coffman Middle School was surprised at the amount of modification she needs to make. Mariger found one module was too simple for the students and was supplemented with other materials. Most modules contained more information than her students could conceptually handle in the class time. Mariger appreciates the fact that she can change the modules to suit her students' needs. The flexibility of changing the modules to accommodate the students is a benefit in modular learning. A teacher's ability to adapt programs to the students learning levels allows the students to effectively progress.

What makes a Learning Activity Good?

A modular learning activity in it simplest form is a presenter of a learning activity or activities that form a unit or concentration of study. A modular learning activity should have the same fundamental basics as a learning activity that a teacher would present to their class. Therefore, the module should be able to be tested with relatively the same evaluation principles that a teacher presenting a learning activity to a class would be tested.

A complete learning activity should have the following implementation principles:

(a) Introduction (teacher communicates goals, purposes, objectives and cues relevant prior knowledge and response strategies).
(b) Initial Scaffolding (teacher explains and demonstrates if necessary, then asks questions or has students work on sample items to make sure that they understand what to do before releasing them to work mostly independently).
(c) Independent Work (students work mostly independently, on their own or with peers, but with teacher monitoring and intervention as needed).
(d) Debriefing/Reflection/Assessment (teacher and students revisit the activity's primary purposes and assess the degree to which they have been accomplished)"(Brophy, 1991, p. 21).

Good introductions to learning activities fulfill at least four purposes or functions:

1) "Motivating students' interest in or recognition of the value of the activity.
2) Communicating its purposes, goals and objectives.
3) Cuing relevant prior knowledge and response strategies.
4) Establishing a learning set by helping students to understand what they will be doing, what they will have accomplished when they are finished, and how their accomplishments will be communicated or evaluated."(Brophy, 1991, p. 21).

Motivating students' interest or recognition of the value of the activity is to make the learning activity meaningful and worthwhile to the student. Motivation can be done by designing the learning activity with the students' interests in mind. Relating the activity to real-life situations making them authentic as possible, and helping students to make connections between the subject matter content of the activity and their personal knowledge or experiences.

Communicating the learning activity goals, purposes and objectives is the next step. Students need to have a clear "understanding that the activity calls for cognitive and affective engagement with important ideas undertaken to accomplish curricular goals, not just completion of a series of steps to fulfill requirements." (Brophy, 1991, p. 22). Each activity must have goals or objectives worth spending the time and trouble to obtain. Many activities lack a primary goal and lose focus. These activities end up being time that is consumed with busy work for the student. The goals and objectives must be drawn from concepts, and teaching these concepts should be the primary goal of the activity. When the activity is built around these goals and objectives there is a better chance that the activity will be worth the time and effort and represent the concepts more

accurately than without objectives. There must be a solid bond between the learning activity and the objectives before a well designed and successful activity can take place.

A good way to activate prior knowledge is to compare the activity that the students are currently doing with an activity that they have previously completed. By comparing and contrasting the similarities of the two assignments and then asking the students to make predictions about the outcomes of the upcoming activity is a good technique for activation prior knowledge.

Initial scaffolding occurs after the students are motivated to do the learning activity. Initial scaffolding is providing whatever explanation and modeling necessary for the students to understand what to do, how to do it, and why it is important. Before the teacher can release the students to work independently, they should provide the student with simple activities that focus on the skills that will be needed to successfully complete the learning activity. With coaching and appropriate task simplification the student may acquire the skills needed to work independently and successfully complete the activity.

Once the students have appropriate skills for the activity they can then work independently. The teacher should monitor the efforts of the students and intervene when the student is in need of additional instructions or to clear up confusion. “Such interventions should not involve doing the tasks for students or simplifying them to the point that they no longer can be expected to engage students in the kinds of cognitive processes that are needed to accomplish the activity’s goals” (Brophy, 1991, p. 22). Instead, the interventions should allow the student to handle as much of the task as they can, and to help them to progress toward fully independent and successful activities.

Feedback should be given more often than just at the end of an activity in the form of grades or comments dealing with the amount of correctness, but feedback should also be given about their performance during the activity. The form of feedback should come in a diagnosis of the reasons why the student has errors and explanation of how these they made these errors, and also the explanation about correctness of their responses.

Many students work through activities without actually thinking about the key ideas and goals of the activity. The activity is designed for the student to develop and apply the key ideas and goals so they may learn them, yet when they finish they put the key ideas and goals aside without thinking about them again. Debriefing the class on what the key ideas and goals of the activity were and how they used them, reflecting on what they did and what they were able to do, and assessing their performance ability to correct and learn from mistakes will encourage them to minimize this problem.

Preparing for the Future

Teachers need to be prepared for the future and the growing needs of the students. G. Rogers (1998) in the article, Concerns about Technology Education Laboratories, expresses alarm, "The question must be asked, in the movement to emphasize modular technology education, have industrial educators been preparing graduates for the realities they find in today's classrooms? Or have industrial teacher educators been preparing graduates with their own philosophy of industrial/ technology education, placing philosophy ahead of school district needs?" (p.93).

The new technology provides a demand of teachers to be ready to teach the new technology. Rogers (1998) notes, "A survey of industrial/technology education

equipment used in today's classrooms would indicate to industrial teacher educators what competencies related to tools, instruments, and machines their graduates should possess" (p.94). Teachers and graduate students need to be trained to teach the new programs developed and associated with modular learning.

There are many factors that have to be addressed before installing module learning in the classrooms. Industrial arts education classes are changing from the traditional shop classes to the technology education classes. Modular learning labs are a part of that change. Taxpayers need to know advantages and disadvantages of modular learning to be able to fully support the new challenges of financing and accepting the new education curriculum.

Furthermore, teachers must become technically literate in order to survive the changing teaching styles and technology advanced classrooms. The public has to be informed of the effectiveness of modular learning in order to change its perception. Modular Learning is a new technology that needs to be tried and tested by teachers before being installed into Technology Education classrooms to determine the degree of match of the students needs and the curricula needs. Modules are another tool for presenting a lesson. They are not a cure-all or a Band-Aid that will patch together a failing program, but a tool that will compliment a healthy technology education program. This study is designed to provide teachers with a useful tool to evaluate modules and will enable teachers to make wise decisions about this presentation tool called modules.

CHAPTER 3
METHODOLOGY

Introduction

The objective of this study is to determine the perceptions technology education teachers have about learning activity modules for technology education as measured by a survey derived from the research. The review of literature has identified specific characteristics that should exist in any quality learning activity module. Teachers, however, have different perceptions of what a quality learning activity module should be and what it should do. This survey is designed to measure some of the perceptions that teachers have about modules.

Data Source

The population for this sample was technology education teachers enrolled in graduate courses at University of Wisconsin-Stout for the second four weeks of summer school session. Out of the 36 graduate students asked to fill out the survey and 34 surveys were returned resulting in a response rate of 94%.

Learning Activity Module Survey Instrument

The testing instrument was survey that consists of seven sections. Each section as they relate to learning activity module has three to five questions. The seven sections are: 1) Demographic Information, 2) General middle school module characteristics, 3) Introduction, 4) Teaching Methods, 5) Laboratory Work, 6) Feedback, 7) Debriefing/reflection/assessment.

The first section deals with the personal information of the subject being surveyed. The demographic information included the amount of teaching experience, licensure, and grade level.

The second through seventh sections are measure by a four point lykert scale with the subject asked to respond with strongly agree, agree, disagree and strongly disagree.

The second section questions deal with the modules correct developmental level for the students that will be using it, the quality of the visuals, freedom of bias and stereotypes, directions and how the objectives match the learning activity and the test questions.

The third section deals the introduction of a learning activity module and what information it should provide the students with. Included were questions related to the overview of the main ideas, the motivation of the students' interests, and communicating clearly the goals purposes and objectives, and integration of students' prior knowledge, a pretest and students perceived outcomes.

The forth section addressed various teaching methods and how they apply to learning activity modules.

The fifth section deals with the independent work of the learning module. The questions deal with allowing the student to handle as much of the work as they can handle, monitoring and intervening when needed, time to practice and apply the knowledge that they learned.

The sixth section is about how the module should give feedback to the student. The questions deal with how the student should receive feedback and if feedback should be given in a form of diagnosis of why the student has errors and how they were made.

The seventh section addresses various methods of debriefing, reflection and assessment of the learning activity.

Procedures Followed

The survey was administered on July 19, 2000 at 8:15 am the first set of graduate students and then at 12:15 a.m. to the second set of graduate students. The survey was handed out and directions were given on how to fill it out. The survey directions started with a brief introduction of who I was and what the survey was about. The issue the confidentiality of the graduate students was discussed and how they were being kept confidential. This was achieved by not asked for any information that could be linked to them, which they could be held accountable for. Personal information such as their name, hometown and where they worked was not asked on the survey. I proceeded to explain the directions of the demographic information and then the learning activity module survey directions. When finished with the directions I asked if there were any questions or things that needed to be clarified. The graduate students were then given ten minutes to complete the survey. All graduate students completed the survey within the allowed time.

Procedures for Data Analysis

The questions were organized into 16 different tables. The data was organized by tables and each question was tabulated. The data collected was analyzed and presented using descriptive statistics (i.e. frequency and mean)

CHAPTER FOUR

RESULTS

The purpose of this study was to determine the perceptions of novice technology education teachers regarding the instructional features of a learning activity module. The data was gathered with a survey that featured items derived from the review of literature. The first section will report the demographic data and the amount of experience of the respondents. The following sections will address:

1. General middle school module characteristics
2. Introduction
3. Teaching Methods
4. Laboratory Work
5. Feedback
6. Debriefing/reflection/assessment

Demographic Information

There were 36 graduate students asked to fill out this survey. They were technology education teachers enrolled in graduate courses at University of Wisconsin-Stout for the second four weeks of summer school session. Out of the 36 educators asked to fill out the survey and 34 surveys were returned resulting in a response rate of 94%.

The first item on the survey asked respondents to report the number of years of experience that the respondent had working with learning activity modules.

Table 1

Demographic Information

Item No.	Years of Experience: No exp.	0-1year	2-4 years	4-6 years	6 or more years
1. How much experience have you had working with modules?	17 (50%)	8 (23%)	6 (18%)	3 (9%)	0 (0%)

Number of Valid Cases: 34

Half of the group had no experience with modular instruction (see table 1). Almost a quarter of them has had one year or less of experience with this mode of instruction. The rest of the respondents had between two to six years of experience. In sum the majority of the respondents have had little, if any experience with the use of modular instruction in technology education.

The second item dealt with the type of licensure the respondent held. A provisional license allows a teacher to work towards licensure while teaching. A fully certified technology teacher holds a 220 license.

Table 2

Demographic Information

Item No.	Type of Licensure: Provisionary License	220 License
2. Are you teaching under a provisional or a type 220 license?	27 (79%)	7 (21%)

Number of Valid Cases: 34

Over three quarters of the teachers surveyed were teaching under a provisional license (see table 2).

The third item on the survey asked respondents to report the number of years of experience that the respondent had teaching in technology education.

Table 3

Demographic Information

	Years of Experience				
Item No.	No exp.	0-3 yrs.	4-8 yrs.	8-12 yrs.	13 or more yrs.
3. How many years of teaching experience do you have?	8 (23.5%)	8 (23.5%)	11 (32%)	6 (18%)	1 (3%)

Number of Valid Cases: 34

The greatest numbers of respondents had 4 to 8 years of experience (see table 3). About half of the respondents have had three years or less of teaching experience.

The item number four asked respondents to identify the state in which they are teaching.

Table 4

Demographic Information

	State of Employment		
Item No.	Wisconsin	or	Minnesota
4. What State do you teach in?	29 (85%)		5 (15%)

Number of Valid Cases: 34

Most of the respondents taught or will be teaching in Wisconsin (see table 4). The remainder of the respondents indicated Minnesota as their state of employment.

The fifth item asked what region of Wisconsin the respondent would teach in next semester.

Table 5

Demographic Information

	Region of Wisconsin	
Item No.	n	Percentage
5. Please specify by circling one of the regions of your state where you will teach next fall.		
Northwestern	1	3%
North central	1	3%
Northeastern	2	7%
West-central	6	21%
Central	7	25%
East-central	2	7%
Southwestern	1	3%
South-central	4	14%
Southeastern	5	17%

Number of Valid Cases: 29

The respondents were from a diverse region of Wisconsin, however the greatest number came from central and west-central Wisconsin (see Table 5).

The sixth item asked the region of Minnesota that the respondent will teach in next semester

The respondents were from west-central, east-central, and south-central Minnesota (see table 6).

Table 6

Demographic Information

	Region of Minnesota	
Item No.	n	Percentage
5. Please specify by circling one of the regions of your state where you will teach next fall.		
Northwestern	0	0%
North central	0	0%
Northeastern	0	0%
West-central	2	40%
Central	0	0%
East-central	2	40%
Southwestern	0	0%
South-central	1	20%
Southeastern	0	0%

Number of Valid Cases: 5

Table seven describes the grade level each of the respondents will be teaching next fall.

Table 7

Demographic Information

	Level of Teaching			
	Middle School	High School and High School	Both Middle	Item No.
6. Please circle the level at which you will teach next fall.	8 (24%)	16 (47%)	10 (29%)	

Number of Valid Cases: 34

About half will be teaching at the high school level (see table 7). Only one quarter were teaching solely at the middle school level.

General Middle School Module Characteristics

Tables 8, 9, 10 and 11 describe the teacher's perspectives on general middle school module characteristics.

The first question asked about specific skills and information that a module teaches.

Table 8

General Middle School Module Characteristics

		Level of Agreement			
		Strongly Agree	Agree	Disagree	Strongly Disagree
Item No.					
1.	Enable students to sample first-hand a specific topic in technology or the world of work..	10 (29%)	20 (59%)	4 (12%)	0 (0%)
2.	Help students develop specific skills for a future trade or occupation.	3 (9%)	9 (26%)	19 (56%)	3 (9%)

Number of Valid Cases: 34

Most of the respondents agreed that modules enable students to sample specific topics in the curriculum (see table 8). However, a majority disagreed with the notion that they should be used to help develop specific skills.

Another item on the survey dealt with information about the use of visual and audio equipment.

Table 9

General Middle School Module Characteristics

Item No.	Level of Agreement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
3. Utilize drawings, photographs and/or other visuals to help present content and examples.	13 (38%)	21 (62%)	0 (0%)	0 (0%)
4. Feature an audio option, or narrator, that reads the text material in the module to reluctant readers.	9 (26%)	12 (35%)	10 (29%)	3 (9%)

Number of Valid Cases: 34

A majority of the respondents agreed that drawing and visuals should be used in presenting the content, however the respondents were divided in their agreement on whether or not a narrator should read material for the student (see table 9).

The next three items dealt with the representation of both men and women, people of different ethnic backgrounds and different age groups engaged in technological activities together.

Table 10

General Middle School Module Characteristics

	Level of Agreement			
Item No.	Strongly Agree	Agree	Disagree	Strongly Disagree
5. Depict both men and women engaged in both traditional and non-traditional roles in society and the world of work.	17 (50%)	15 (44%)	2(6%)	0 (0%)
6. Show people of different ethnic backgrounds engaged in technological activities together.	16 (47%)	17 (50%)	1 (3%)	0 (0%)
7. Feature people of different age groups interacting together in technological activities.	16 (47%)	14 (41%)	4 (12%)	0 (0%)

Number of Valid Cases: 34

A majority of the respondents believe that both men and women, people of different ethnic backgrounds and different age groups engaged in technological activities together should be represented in the module (see table 10).

The next three items of the survey address the relationship of the modules objectives to test items and learning activities.

Table 11

General Middle School Module Characteristics

		Level of Agreement			
		Strongly Agree	Agree	Disagree	Strongly Disagree
	Item No.				
8.	Utilize learning activities that address the concepts and skills outlined in the module's objectives.	15 (44%)	19 (56%)	0 (0%)	0 (0%)
9.	Have multiple test items that measure the extent to which the student achieved the objectives of the module.	11 (32%)	23 (68%)	0 (0%)	0 (0%)
10.	Have detailed directions that outline how students are to proceed through the learning activity materials.	13 (38%)	20 (59%)	1 (3%)	0 (0%)

Number of Valid Cases: 34

All of the respondents either agreed or strongly agreed that concepts and test items should originate and match the objectives of the learning activity (see table 11). Furthermore, only three percent disagreed that the module should provide detailed directions that outline how the students are to proceed through the learning activity materials

Introduction

The seven items shown in table 12 address the introduction portion of the learning activity.

A majority of the respondents strongly agreed that the introduction should have and overview of the main ideas, relate content to real life situations and define the objectives so the students knows what to do (see table 12). Over half of the respondents agreed on the use examples that capitalize on student interests, recall prior knowledge to relate to new concepts and pretesting for existing knowledge and skills. Only about one fifth of the respondents disagreed with asking students to declare some ideas about the topic that they would like to test or prove before beginning the activity.

Table 12

Introduction

Item No.	Level of Agreement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
11. Provide students with an overview of the main ideas that will be studied during the module.	20 (59%)	14 (41%)	0 (0%)	0 (0%)
12. Capitalize on examples that are consistent with the interests and experiences of students.	14 (41%)	19 (56%)	1 (3%)	0 (0%)
13 Relate the content of the module to real situations in everyday life and the world of work.	21 (62%)	13 (38%)	0 (0%)	0 (0%)
14. Define the goals, purposes, and objectives of the module so students understand what they will be expected to know and be able to do.	19 (56%)	15 (44%)	0 (0%)	0 (0%)
15. Ask students to recall prior knowledge and experiences that relate to the concepts and skills being address in the module.	14 (41%)	20 (59%)	0 (0%)	0 (0%)

Number of Valid Cases: 34

Table 12 (Continued)

Introduction

Item No.	Level of Agreement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
16. Pretest the students on the topic in question to determine the knowledge and skills that they bring to the module.	13 (38%)	19 (56%)	2(6%)	0 (0%)
17. Ask students to declare some ideas about the topic that they would like to test or prove before they begin the activity.	9 (26%)	18 (53%)	6 (18%)	0 (0%)

Number of Valid Cases: 34

Teaching Methods

The nest five items, described in table 13, relate to the teaching methods incorporated in modules.

Table 13

Teaching Methods

Item No.	Level of Agreement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
18. Provide students with simple activities that focus on the knowledge needed to achieve the objectives.	15 (44%)	0 (0%)	17 (50%)	2(6%)
19. Provide students instruction about the tools and materials that they will be using during the course of the module.	15 (44%)	19 (56%)	0 (0%)	0 (0%)
20. Include a help feature so students can acquire the knowledge they need to work independently.	18 (53%)	16 (47%)	0 (0%)	0 (0%)
21. Explain and demonstrate the knowledge needed to successfully achieve the objectives of the module.	16 (47%)	18 (53%)	0 (0%)	0 (0%)
22. Ask questions to make sure that the student has an understanding of key ideas before they can progress to the next activity.	12 (35%)	22(65%)	0 (0%)	0 (0%)

Number of Valid Cases: 34

An overwhelming majority of the respondents agreed or strongly agreed that the module should include simple activities that focus on the knowledge and provide students instruction about tools (see table 13). The module also should demonstrate and ask questions about the needed knowledge for the activity and should include a help feature so the student could acquire needed knowledge.

Laboratory Work

Table 14 contains data from the next three items. These items deal with the level of instruction and feedback within the laboratory work.

Table 14

Laboratory Work

	Level of Agreement			
Item No.	Strongly Agree	Agree	Disagree	Strongly Disagree
23. Provide less and less direct instruction as the student progress through the learning activities.	11 (32%)	19 (56%)	4 (12%)	0 (0%)
24. Provide students feedback about their responses to acknowledge their progress or to provide them additional information as needed.	13 (38%)	21 (62%)	0 (0%)	0 (0%)
25. Provide an opportunity	17 (50%)	16 (47%)	1 (3%)	0 (0%)

to practice and apply what they have learned to new situations from everyday life or the world of work.

Number of Valid Cases: 34

An overwhelming majority of the respondents strongly agreed or agreed that the module should give the student an opportunity to practice what they have learned (see table 14). Just over half of the respondents agreed on providing less instruction as the student works through the activity and providing them feedback and additional information when needed.

Feedback

Table 15 shows that the over half of the respondents strongly agreed that the teacher should be able receive feedback on how and why the students are making errors (see table 15). A majority of the respondents agreed that feedback should be given throughout the activity so that students may adjust their performance. The respondents were divided on their agreement on limiting feedback until the completion of the learning activity.

Table 15

Feedback

	Level of Agreement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Item No.				
26. Be limited until the completion of the learning activity with an evaluation of performance at the end.	2(6%)	15 (44%)	15 (44%)	2(6%)
27. Provide the teacher the information needed to diagnose the reasons why students are making errors.	18 (53%)	14 (41%)	2(6%)	0 (0%)
28. Be given throughout the activity so the student may have a chance to adjust their performance.	11 (32%)	22(65%)	1 (3%)	0 (0%)

Number of Valid Cases: 34

Debriefing/Reflection/Assessment

The last five test items addressed Debriefing/Reflection/Assessment portion of learning activity modules. This section deals with having the opportunity to assess their own performance, reflect on how their new knowledge can be used in everyday life.

A majority of the respondents agreed that the conclusion of the modules should require students to reduce concept and skills (see table 16). Half of the respondents agreed that students should have multiple opportunities to answer post-test items as well

as feedback about how well they accomplish the goals and objectives. Only six percent of the respondents disagreed with giving students the opportunity to assess their own performance. All of the respondents agreed or strongly agreed that modules should reflect on how the student's new knowledge could be used in everyday life.

Table 16

Debriefing/Reflection/Assessment

	Level of Agreement			
	Strongly Agree	Agree	Disagree	Strongly Disagree
Item No.				
29. Require students to reduce all the concepts and skills that they studied during the module in ways that link them back to their intended goals and objectives.	8 (23.5%)	24 (70.5%)	2(6%)	0 (0%)
30. Give students the opportunity to assess their own performance and to declare what they have learned.	16 (47%)	16 (47%)	2(6%)	0 (0%)
31. Give students multiple opportunities to correctly answer items on the post-test.	6 (18%)	17 (50%)	9 (26%)	2(6%)
32. Provide students feedback about the extent to which they accomplished the goals and objectives.	16 (47%)	17 (50%)	1 (3%)	0 (0%)

33. Remind students where	15 (44%)19 (56%) and how their new knowledge can be used in everyday life and the world of work.	0 (0%)	0 (0%)

Number of Valid Cases: 34

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

Technology education is changing with new technologies springing up everyday. With these new technologies emerging teachers are faced with challenges of teaching. Schools must be prepared to meet the requirements of teaching new technologies, and one way is by introducing modular learning. Modular learning is a new approach to the delivery of technology education. Many factors need to be considered before modular learning should be integrated into the technology classroom. Where will the financing for a new modular technology lab come from, what level of educational value do these programs they are purchasing have. This study was the first step in establishing criteria for the evaluation of learning activity modules. It sought to determine the features and characteristics technology education teachers perceive as having educational value.

Purpose of the Study

The purpose of this study was to determine the perceptions that novice technology education teachers have about learning activity module for technology education. The data was gathered with a survey featuring items that were constructed around the features and characteristics that should exist in any quality learning activity. More specifically, the survey asked the teachers if these features and characteristics should also be present in a learning activity module. The results of the survey measured and answered the research question of what features and

characteristics technology education teacher perceived as having educational value for a learning activity module.

Methods and Procedures

The survey was administered to 36 graduate students on July 19, 2000. Half of the respondents had no experience with modules. A quarter of them has had one year or less, and the balance had between two to six years of experience with modular instruction. Over three fourths of the teachers surveyed were teaching under a provisional license. The greatest number of respondents had 4 to 8 years of teaching experience. The respondents represented a diverse region of Wisconsin. About half were teaching at the high school level. Only one fourth were teaching solely at the middle school level.

Major Findings

The findings answer the question of what features and characteristics novice technology education teachers perceive as having educational value for a learning activity module.

The results of this study support the notion that modules should enable students to sample specific topics in the curriculum. At the same time, there is a general agreement that modules should not be used to help develop specific vocational skills.

The data show that modules should use drawings and visuals to present the content. Moreover, they should be representative of both men and women, people of different ethnic backgrounds and different age groups engaged in technological activities.

The data also indicated that the module concepts and test items should originate and match the objectives of the learning activity. Good modular instruction should help students connect the content to be learned with patterns of knowledge, everyday life, past experiences and existing knowledge, and what will be expected on the evaluation.

The teaching methods incorporated within learning modules should include simple activities that focus on the knowledge, provide students instruction about tools, and demonstrate and ask questions about the knowledge needed for the activity.

The ability for students to practice what they have learned through independent work is another characteristic that represents a quality learning module. Less instruction should be provided as the student works through the activity, and feedback and additional information should be provided to the student as needed.

The data support that teachers should receive feedback on how and why the students are making errors. Feedback should be given throughout the activity so that the student may adjust their performance.

A learning module having educational value should provide students with an opportunity to reflect on how new knowledge can be used in everyday life. It should also allow students to be able to reduce learned concepts and skills, give them an opportunity to assess their own performance, and provide them with feedback about how well they accomplished the goals and objectives.

Conclusions

Based on the findings of this study, the following conclusions were drawn. Quality Modular instruction should:

1. Enable students to sample specific topics in the curriculum.
2. Utilize Drawings and visuals that present the content and examples.
3. Depict both men and women, people of different ethnic backgrounds and different age groups engaged together in technological activities.
4. Integrate concepts and test items that originate from and match the objectives.
5. Have directions that lead the student through the module.
6. Help students connect the content to be learned with patterns of knowledge, everyday life, past experiences of existing knowledge, and what will be expected on the evaluation.
7. Include simple activities that focus on the knowledge needed to achieve the objectives
8. Provide students with instruction and demonstration on tools and materials.
9. Ask questions about the knowledge needed to successfully achieve the objectives.
10. Allow students to practice what they have learned through independent work.
11. Provide less and less instruction as the student works through the activity.
12. Give additional feedback and information to the student as needed.
13. Provide feedback on how and why the students are making errors to teachers.
14. Give feedback to the student throughout the activity so they may adjust their performance.
15. Provide students with an opportunity to reflect on how their new knowledge can be used in everyday life and the world of work.
16. Allow students to reduce learned concepts and skills and link them back to the objectives.

17. Give them an opportunity to assess their own performance, and provide them with feedback about how well they accomplished the goals and objectives.

The conclusions of this study should be developed into criteria for the evaluation learning activity modules for the technology education curriculum.

Recommendations

Based on the conclusions of this study, the following recommendations were made.

1. When selecting modules for implementation into a technology education program, teachers should carefully review all features and characteristics of the learning activity module. Special emphasis should be placed on intellectual continuity between the objectives, learning activities, and assessment items. Furthermore, the module should follow at least a simple model of instruction that includes an overview of the content, a definition of objectives, a clear presentation of the key concepts and skills, multiple opportunities for students to apply and practice their concepts and skills, and lastly, assessment tools that measure student learning.
2. When selecting a learning activity module, a teacher should have criteria for evaluating the educational value of the instruction. Therefore, criteria should include the features outlined in this study that were validated by classroom teachers.

Recommendations for Further Study

Based on the findings and the conclusions of this study, the following items are recommended for further research.

1. The result of this study should be developed into an evaluation that can test modules on the basis of what technology education teachers perceive as educational value in a module.
2. This study should be re-administered to more experienced technology education teachers or who are experts in the field of modular learning. The results of this study

should then be compared with the second study to give a stronger foundation for an evaluation.

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APPENDIX

Survey Instrument

Appendix A

Learning Activity Module Survey

Directions: Read each statement carefully. Based on your experiences as Technology Educators answer all the questions to the best of your ability.

Demographic Information

7. How much experience have you had working with modules? (circle one)

   No exp. 0-1year 2-4 years 4-6 years 6 or more years

8. Are you teaching under a provisional or a type 220 license? (circle one)

   Provisionary License 220 License

9. How many years of teaching experience do you have? (circle one)

   No exp. 0-3 years 4-8 years 8-12 years 13 or more years

10. What State do you teach in? (circle one or specify)

    WI or MN other_____.

11. Please specify by circling one of the regions of your state where you will teach next fall. (circle one)

    Northwestern North central Northeastern

    West-central Central East-central

    Southwestern South-central Southeastern

12. Please circle the level at which you will teach next fall.

    Middle School High School Both Middle and High school

Learning Activity Module Survey

Directions: Listed below are a series of statements about teaching and learning. Read each of the following statements carefully. Indicate the extent to which you think these ideas should be applied to modular instruction by **circling** either strongly agree, agree, disagree, or strongly disagree. All answers will be kept confidential.

At the Middle School level a learning activity module should:

1. Enable students to sample first-hand a specific topic in technology or the world of work..

   Strongly Agree Agree Disagree Strongly Disagree

2. Help students develop specific skills for a future trade or occupation.

   Strongly Agree Agree Disagree Strongly Disagree

3. Utilize drawings, photographs, and/or other visuals to help present content and examples.

   Strongly Agree Agree Disagree Strongly Disagree

4. Depict both men and women engaged in both traditional and non-traditional roles in society and the world of work.

   Strongly Agree Agree Disagree Strongly Disagree

5. Show people of different ethnic backgrounds engaged in technological activities together.

   Strongly Agree Agree Disagree Strongly Disagree

6. Feature people of different age groups interacting together in technological activities.

   Strongly Agree Agree Disagree Strongly Disagree

7. Utilize learning activities that address the concepts and skills outlined in the module's objectives.

   Strongly Agree Agree Disagree Strongly Disagree

8. Feature an audio option, or narrator, that reads the text material in the module to reluctant readers.

   Strongly Agree Agree Disagree Strongly Disagree

9. Have multiple test items that measure the extent to which the student achieved the objectives of the module.

   Strongly Agree Agree Disagree Strongly Disagree

10. Have detailed directions that outline how students are to proceed through the learning activity materials.

    Strongly Agree Agree Disagree Strongly Disagree

The introduction of a learning activity module should:

11. Provide students with an overview of the main ideas that will be studied during the module.

    Strongly Agree Agree Disagree Strongly Disagree

12. Capitalize on examples that are consistent with the interests and experiences of students.

    Strongly Agree Agree Disagree Strongly Disagree

13. Relate the content of the module to real situations in everyday life and the world of work.

    Strongly Agree Agree Disagree Strongly Disagree

14. Define the goals, purposes, and objectives of the module so students understand what they will be expected to know and be able to do.

    Strongly Agree Agree Disagree Strongly Disagree

15. Ask students to recall prior knowledge and experiences that relate to the concepts and skills being address in the module.

    Strongly Agree Agree Disagree Strongly Disagree

16. Pretest the students on the topic in question to determine the knowledge and skills that they bring to the module.

    Strongly Agree Agree Disagree Strongly Disagree

17. Ask students to declare some ideas about the topic that they would like to test or prove before they begin activity.

    Strongly Agree Agree Disagree Strongly Disagree

The teaching methods used during the module should:

18. Provide students with simple activities that focus on the knowledge needed to achieve the objectives.

    Strongly Agree Agree Disagree Strongly Disagree

19. Provide students instruction about the tools and materials that they will be using during the course of the module.

    Strongly Agree Agree Disagree Strongly Disagree

20. Include a help feature so students can acquire the knowledge they need to work independently.

    Strongly Agree Agree Disagree Strongly Disagree

21. Explain and demonstrate the knowledge needed to successfully achieve the objectives of the module.

    Strongly Agree Agree Disagree Strongly Disagree

22. Ask questions to make sure that the student has an understanding of key ideas before they can progress to the next activity.

    Strongly Agree Agree Disagree Strongly Disagree

The laboratory activity in the module should:

23. Provide less and less direct instruction as the student progress through the learning activities.

    Strongly Agree Agree Disagree Strongly Disagree

24. Provide students feedback about their responses to acknowledge their progress or to provide them additional information as needed.

    Strongly Agree Agree Disagree Strongly Disagree

25. Provide an opportunity to practice and apply what they have learned to new situations from everyday life or the world of work.

    Strongly Agree Agree Disagree Strongly Disagree

Feedback from module should:

26. Be limited until the completion of the learning activity with an evaluation of performance at the end.

    Strongly Agree Agree Disagree Strongly Disagree

27. Provide the teacher the information needed to diagnose the reasons why students are making errors.

    Strongly Agree Agree Disagree Strongly Disagree

28. Be given throughout the activity so the student may have a chance to adjust their performance.

    Strongly Agree Agree Disagree Strongly Disagree

The end of the module should:

29. Require students to reduce all the concepts and skills that they studied during the module in ways that link them back to their intended goals and objectives.

    Strongly Agree Agree Disagree Strongly Disagree

30. Give students the opportunity to assess their own performance and to declare what they have learned.

    Strongly Agree Agree Disagree Strongly Disagree

31. Give students multiple opportunities to correctly answer items on the post-test.

    Strongly Agree Agree Disagree Strongly Disagree

32. Provide students feedback about the extent to which they accomplished the goals and objectives.

    Strongly Agree Agree Disagree Strongly Disagree

33. Remind students where and how their new knowledge can be used in everyday life and the world of work.

    Strongly Agree Agree Disagree Strongly Disagree

I understand that by returning this questionnaire, I am giving my informed consent as a participating volunteer in this study. I understand the basic nature of the study and agree that any potential risks are exceedingly small. I also understand the potential benefits that might be realized from the successful completion of the study. I am aware that the information is being sought in a specific manner so that no identifiers are needed and so that confidentiality is guaranteed. I realized that I have the right to refuse to participate and that my right to withdraw from participation at any time during the study will be respected with no coercion or prejudice.

Note Questions or concerns about participation in the research or subsequent complaints should be addressed first to the researcher (Aaron Sands 715-287-4511) or research advisor (Dr. Ken Welty 715-232-1206) and second to Dr. Ted Knous, Chair, UW-Stout Institutional Review Board for the Protection of Human Subjects in research, 11 HH UW-Stout, Menomonie, WI 54751, phone (715) 232-1126